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Ether Day Address
1914

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BY

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THE SIGNIFICANCE AND EFFECT OF PAIN *

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FOR the great honor of being invited to deliver the Ether Day Address for the year 1914, I wish first to express my sincere thanks and appreciation to the trustees and officers of the Massachusetts General Hospital. Returning, as I do, after the lapse of a quarter of a century, my mind is filled with memories of the time so pleasantly and profitably spent as a house pupil in the wards of this hospital, just twenty-five years ago. As a member of the old West Side surgical staff, it was my great privilege to serve under those master surgeons, John Homans, Charles B. Porter, and Arthur T. Cabot, and to have the opportunity to observe the work of their equally illustrious colleagues on the East Side, H. H. A. Beach, Maurice H. Richardson, and John Collins Warren. I should be untrue to myself and ungrateful indeed if I failed at this time and in this place to acknowledge the debt that I owe to these distinguished men and their associates upon the staff of this hospital, for the stimulus received from them toward high ideals in thought and work; for kindly admonition and advice; for encouragement when sorely needed; and best of all, for that unconscious aid and instruction so freely imparted and received in that intimate personal association which always characterizes the relationship between the true teacher and his pupils. The Massachusetts General Hospital, in the value of its scientific achievements and in its long roll of illustrious names, has contributed much to American medicine. From its earliest beginnings it has always stood for the best things in medicine and surgery, and in many respects has served as a model for others to follow. But illustrious as is its past and glorious as are the promises for its future, for me at least it can never be quite the same as it was twenty-five years ago. For I miss the presence of those, my teachers and friends, who by

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their strong personalities made this hospital what it was to us who were fortunate enough to have been in any way associated with them. Recurring visits to these venerable halls from time to time have been saddened by the loss, one after another, of these familiar faces, until now but one remains, full of years and of honors richly deserved and honestly won. Long may he live, and never grow older, to enjoy the fruits of his abundant labors and the affectionate regard of his friends and former pupils.

Upon this occasion when we are gathered together to celebrate what Dr. Mitchell has so happily termed the "Death of Pain," it is fitting that we should stop for a moment to consider as best we can just what it would mean if this designation were literally true. Would that it were! But as a matter of fact the field of usefulness of ether, large and important as it is, does not extend far beyond the confines of the operating room. Here it has through its beneficent influence largely robbed surgical operations of their terrors both for the patient and the surgeon, for in these days the performance of a major surgical operation upon a conscious, suffering patient is almost inconceivable. They were indeed giants in the surgical profession in those pre-anesthetic days, men of iron nerve and indomitable will, who could bring themselves to inflict such untold anguish upon their fellow-men, even in the hope of ultimate relief. And what of the patient? This is but a marked illustration of the impelling power of pain, for it requires but a bad enough pain for a long enough time to break down all barriers and to cause the sufferer to submit willingly, yes, eagerly, to anything at all, even death itself, that offers hope of relief.

We have tried with but ill success to picture in our mind a world that was literally free from pain. What a Paradise it would be! Suppose that such a thing as the abolition of pain were possible. This of necessity would almost mean the abolition of disease, for it is quite impossible to think of pain apart from disease or injury, the two have been for so long a time so intimately associated in the human mind. For what is the meaning of the term disease, *dis-ease*, but the opposite of comfort, and what is that in its commonest form

but pain? Rob ill health of the pain it causes and its chief terror is gone. But try for a moment to form some sort of a mental picture of the conditions that would exist under such circumstances. Would the world be better off or not? In other words, is the existence of pain of any distinct benefit to the human race, or is it not? In what ways is it harmful, how beneficial? Every one who has been obliged from any cause to experience it, or who has witnessed its effect upon others, can well appreciate what a boon to humanity its abolition would be. To be relieved of the mental anguish, the awful fear and dread of a recurrence of an attack of pain through which one may have passed, means almost as much as to be relieved of the pain itself. Think what all this would mean to suffering humanity. It cannot be estimated!

On the other hand, is there anything that would be lost that is of real advantage? This suggests the thought that, after all, pain may have its uses and a definite value both to the patient and to the surgeon. What are they? What are its effects, good as well as bad? We may hope, perhaps, by observation and investigation to gain some insight into these effects and learn something of its clinical significance. It is to this phase of the subject that I wish particularly to direct your attention.

These questions must, I am sure, have come with especial emphasis to every thoughtful surgeon, accustomed as he is from the nature of his work to the sight and sounds of pain; called upon as he is to inflict pain that relief may follow, to witness daily its effects and results, and to try to find out and remove its causes. They must also have come, and with even greater force, to one who has been called upon himself to lie upon a bed of suffering, and has counted the hours as they dragged wearily and endlessly through the long night watches; or who, while keeping sleepless vigil by the bedside of some loved one, has listened helplessly to the stifled cries and groans, or, harder still, has witnessed in the agonized countenance the mute evidences of intense pain. He must many times have wondered at it all and asked himself the question, "Why must it be so?" Why should human beings be called upon to suffer as some of them are,

the innocent along with the guilty? Because the fathers have eaten sour grapes why should the children's teeth be put on edge?

Ever since that evening in the Garden of Eden when the curse of sorrow and pain was placed upon our first parents these as yet unanswered queries have lingered in the minds of their descendants, and I fancy that they will continue to arise in the minds of succeeding generations, and will fail of a satisfactory answer until the dawning of that blessed day to which reference is made in the inscription carved upon the monument erected to commemorate this happy event, which stands in yonder Public Garden, "Neither shall there be any more pain."

The mystery of pain! Has anything in the way of human experience given rise to more wonder or speculation than this? The passions, love and hate, have at times, perhaps, stirred to greater action or deeper feeling. Religious zeal has aroused and lifted the thoughts and emotions to higher planes, patriotism and the martial spirit have ever spurred to deeds of heroism and valor, but I doubt whether any other human experience has been more universal or more controlling than that of pain. The pursuit of pleasure in some of its manifold forms has occupied the mind more continuously, perhaps, but the avoidance of pain and the institution of measures to relieve it have ever occupied a not inconsiderable share of its attention, and will continue to do so until the end of time.

Most of the important epochs of a lifetime are intimately associated with pain or are greatly influenced by it. The beginning of life and the end of it are occasions that are rarely dissociated from pain. We speak of the pains of labor in such a way that the two terms are almost synonymous, and one rarely thinks of the one without the suggestion of the other. This is likewise true of the other extreme of life, but not to the same extent. The "pangs of death" is an expression used by the poets, but nevertheless an intimate association of ideas is thereby expressed which, while more fanciful than real, perhaps, has its effect upon the human mind. Few experiences, indeed, there are that are really worth while that are not in some way or other

intimately associated with or influenced by human suffering. Pain is such a universal experience that it has been felt in a greater or less degree by every one. Indeed psychologists tell us that we never have a sensation or an idea which is not felt with some degree of pleasure or pain, and so it is that the study of it has excited interest in many minds and in all ages. But its cause and the reason why remain a mystery still.

What will implacable, beyond our ken,
Set this stern fiat for the tribes of men!
This none shall 'scape who share our human fates:
One stern democracy of anguish waits
By poor men's cots, — within the rich man's gates.
What purpose hath it? Nay, thy quest is vain:
Earth hath no answer: if the baffled brain
Cries, 'tis to warn, to punish — Ah, refrain!
When writhes the child beneath the surgeon's hand,
What soul shall hope that pain to understand?
Lo! Science falters o'er the hopeless task,
And Love and Faith in vain an answer ask,
When thrilling nerves demand what good is wrought,
Where torture clogs the very source of thought.

—Weir Mitchell.

It is a difficult task that we have set ourselves, the discussion of the significance and effect of pain. The subject is a very broad one, too broad, indeed, to do full justice to in the limited time at our disposal. It is many sided, and we can do no more than indicate and briefly discuss some of the phases that are of particular interest and real significance to the surgeon.

The cause of pain is one thing, its significance another. But in order the more fully to understand the one we must know something about the other. Indeed, it is absolutely essential to be more or less familiar with the results of recent investigations in order to be able to understand many of the phenomena observed. As is usually the case in every live subject, the observations and opinions of investigators in this field do not entirely agree. Nevertheless, certain fundamental facts have been established, a brief summary of which will aid us to a better understanding of our subject.

In the preparation of this paper we have consulted many

authors,— Hilton, Lennander, Mackenzie, Ross, Head, Sherrington, Meltzer, Hertz, Schmidt, Howell, Behan, Crile, Cannon, and others, and we wish here to make acknowledgment of the free use made of their opinions and results.

The anatomy and physiology of the pain-conducting apparatus has been carefully studied by many observers, but as yet no very satisfactory results have been obtained. They tell us that "Pain is probably the sense that is most widely distributed in the body. It is present throughout the skin, and under certain conditions may be aroused by stimulation of sensory nerves in the various visceral organs, indeed in all the membranes of the body."

Experimental studies upon the exposed brains of living animals, as well as clinical observations upon conscious patients in the course of surgical operations, giving rise to extensive explorations into the tissues of the brain itself, lead to the belief that it is insensible to pain. Cushing was the first to show that the dura also was insensible to the ordinary stimuli for pain. The adequate stimulus here seems to be, as in the intestine, tension in some form.

"For cutaneous pain, at least, the evidence is very strongly in favor of the view that there exists a special set of fibers which have a specific energy for pain. It would appear that the pain sense has a punctiform distribution in the skin. Histological examination of these pain points indicates that they have no special end organ, the stimulus taking effect upon the free end of the nerve fibers" (Howell). Any of the usual forms of artificial nerve stimuli may affect these endings, and if of sufficient intensity can give rise to pain. Until comparatively recently it has been taken for granted that the sensory phenomena of disease could be explained only on the assumption that the viscera were well supplied with nerve fibers which could convey impulses leading to the sensation of pain (Hertz). Although as early as 1753 Haller, as pointed out by Hertz, had failed to obtain any evidence that the pleura, peritoneum, lungs, liver, spleen, or kidneys of animals were sensitive to pain, the first real doubt was cast upon prevailing belief when it was observed that during the second stage of a colostomy the manipulation and cutting of the walls of the colon in a patient per-

fectly conscious were unattended by pain, indeed were entirely without sensation. The subject then became the basis of wide interest and investigation. The publications of different observers, notably Hilton in his classical lectures on "Rest and Pain," and the investigations of Ross, published in 1858, stimulated interest and further work in the study of the nature and methods of transmission of pain.

In his investigations of visceral diseases Ross divided pain into two forms, splanchnic and somatic. His ideas were very similar to those which had been previously expressed by Hilton and Lange. He thought that "the impulses produced by irritation of the peripheral terminations of the splanchnic nerves were conducted by the posterior roots to the posterior horns of the spinal cord, where they diffuse to the roots of the corresponding somatic nerves, and thus cause an associated pain in the territory of distribution of these nerves." This work of Ross opened up a large field for investigation and stimulated the splendid work of Head and Mackenzie, who still further corroborated the observations of Hilton and Ross, and on the weight of their authority these ideas became generally accepted. Head's work dealing with the areas of cutaneous hyperalgesia occurring in visceral disease, by demonstrating that they are identical with the areas which receive their sensory nerve fibers from the spinal segments to which the afferent fibers from the diseased viscera pass, proved conclusively the soundness of the earlier deductions. Divergent views were held by Mackenzie and Ross as a result of their experiments. The former had observed that in visceral disease in addition to the tenderness in the skin, as mapped out by Head, there was a similar sensitiveness in the muscles and parietal subperitoneal tissue, supplied by the corresponding spinal segments. He as a result of his observations came to the conclusion that all pain in abdominal disease originates in the peripheral structures. Ross, on the other hand, adhered to the idea of splanchnic or visceral and somatic or referred pain. Since this time much additional work has been done and published records of investigations by many observers have accumulated. From this mass of work several facts stand out prominently: (1) That any nerve ending may be sensitive

to some one form of stimulation which has been called "the adequate stimulus," but insensitive to all others. The failure to take this fact into account explains a great many of the discrepancies which have occurred in the reports of the work of earlier observers. The adequate stimuli for pain vary for different regions and structures of the body,—for instance, those for visceral pain are not of the ordinary tactile or thermal types to which the skin and mucous surfaces so promptly respond, but are tension in some form or other. It must not be forgotten, however, that while these other forms of stimuli may not be capable of exciting specific receptors in the intestinal walls, nevertheless they are capable of inducing motor reflex activities which in turn cause contraction, and those contractions which cause tension to mount to the deep sensibility threshold result in pain. A great deal of discussion has been given to the question as to the channels through which intestinal pain is transmitted, but that pain is actually felt in lesions of the intestinal canal cannot be doubted. (2) That the threshold of pain, that is, the point at which pain as a result of any form of stimulation begins to be felt, may be raised or lowered, according to certain established conditions. (3) That tension in some form or other is the commonest, perhaps the sole cause of visceral pain. Meltzer in the course of his investigations attempted to explain all forms of colic as due to a disturbance of what he called "The law of contrary innervation," which is the name he gave to the well-known physiological law of the intestine, namely, that contraction in one place is always associated with relaxation just below. Interference with this law due to organic disease, or to direct or reflex spasm, giving rise to tension as a result of traction upon the parietal attachments, or distention of the intestinal wall, produces visceral pain in some of its protean manifestations. Hertz and others insist that this is the sole cause of true visceral pain. This pain, in turn, is referred to the peripheral structures in accordance with the views expressed above.

From my own clinical observations made in the course of surgical operations upon conscious patients I am convinced that Ross is right in his contention that there are two forms of pain, splanchnic and somatic, and that in a number of

conditions at least — such, for instance, as the common forms of colic, — visceral pain alone is present. It is not always easy, indeed not possible, to distinguish between these two forms of pain, for they are not infrequently both present at the same time.

As against the idea that pain can originate in the viscera has been urged the fact of the patient's inability accurately to localize it. The same is true, of course, of the skin, as it is well known that cutaneous irritation of certain parts of the trunk cannot be localized within wide limits. The argument is advanced that if the pain of gastric ulcer, for instance, is produced in the ulcer itself, it should move when the stomach moves, but, as a matter of fact, the pain remains stationary. This phenomenon is explained by Hertz on the ground of average localization, that is, the pain is referred to the point on the surface of the skin under which the stomach should normally lie. He would give this as the reason why visceral pain is most accurately localized in those viscera which move the least, as the gall bladder, duodenum, and esophagus, and is least accurately localized in the more mobile portions, that is, the large and small intestine.

Cutaneous pains are as a rule located more or less accurately at the point stimulated, whereas in the case of pain arising in the internal organs this is not the case. Here are observed what have been designated clinically as "referred pains." Head in his classical studies of this subject has shown very conclusively that the different visceral organs have a more or less definite relation to certain areas in the skin. With painstaking accuracy he has marked these out and determined their association with the different spinal segments. The misreference of pain observed is ascribed to a diffusion in the nerve centers. This diffusion Head explains on the ground that in the case of a painful stimulus applied to a part of low sensibility in close central connection with a part of much higher sensibility, the pain produced is felt in the latter rather than in the former, to which the stimulus was actually applied. It is generally accepted by physiologists that the afferent neurones from the viscera have a common path of entry into the cord from the posterior root. The theory of "referred pain," then, is that "some-

where in this common path the excitement of the splanchnic afferents is transmitted to the somatic afferents, and that the cerebral center for these being stimulated, the mind suffers an illusion and refers the source of the irritation out to an area of skin" (Harris).

A knowledge of these few facts will aid materially in the understanding of that large and interesting group of reflected or referred pains with which every surgeon of experience is familiar. It is often difficult enough to determine with any degree of accuracy the cause and significance of a pain in the part directly affected. Take, for instance, a pain occurring in the upper right-hand quadrant of the abdomen. A great many possibilities at once suggest themselves to any one familiar with the pathological anatomy of this region. When, however, the pain is referred to some part of the body far distant from its point of origin and is accompanied by no appreciable symptoms suggestive of this fact, the difficulties in the way of an accurate diagnosis are multiplied many fold.

For example, some years ago I was called in consultation to see a youth of seventeen who the day before, while returning from a chestnutting expedition, and after having eaten very freely of the raw nuts, was suddenly seized with a severe pain in the lower right side of the abdomen. There was no history of similar previous attacks. I found the boy in bed, his right leg drawn up. He looked sick, complained of pain referred to the lower part of the abdomen. Temperature and pulse both elevated, nausea and vomiting. Examination showed tenderness over the lower part of the abdomen on both sides. No muscle spasm. Attempts to straighten the leg increased his pain. Hip joint negative, slight pain on urination. There had been no chill. There was present a cough which bothered him greatly. Expectoration was considerable, whitish. Examination of chest was negative, except for a few coarse râles. Diagnosis uncertain, probably appendicitis. Immediate removal to the hospital was advised and declined until the next day, when the patient entered the Johns Hopkins Hospital and was seen in consultation with several members of the staff. By this time the sputum had become slightly blood tinged.

His cough caused a good deal of pain, especially in the lower right side of the abdomen. Examination of the chest showed only evidence of slight bronchitis. Abdomen fairly soft and permitted deep palpation everywhere, except low down over the symphysis and on the right side just above Poupart's ligament. Pressure here gave pain and a slight muscle spasm was present. The right thigh still remained flexed and could not be extended without pain. No tenderness to be made out about the hip joint or surrounding structures. Examination otherwise negative. Leucocytes 19,500, temperature 104, pulse 120. It was then learned for the first time that the patient had been exposed to typhoid fever, which fact influenced our opinion somewhat toward a possible typhoid, although the widal was negative. A central pneumonia with diaphragmatic pleurisy could not be excluded. Abdominal symptoms referred to the region of the psoas muscle were also not satisfactorily explained. Two days later the patient was seen by Dr. Osler, who dictated the following note: "Suspicious spots in right flank suggesting rose spots, definite dicrotism of pulse, some piping râles over right base, some impairment in left axilla; there is an indefinite mass just above the symphysis pubis, palpable and tender." Dr. Osler concurred in the diagnosis of possible typhoid fever. No appreciable change was observed in the patient's symptoms during the next two days, when suddenly a swelling appeared in the upper part of the thigh. Synchronous with the appearance of this swelling the abdominal pain and tenderness markedly improved. The diagnosis was then changed to acute epiphysitis with osteomyelitis of the upper end of the femur. The swelling was at once incised and a considerable quantity of pus evacuated. The patient improved considerably after this and was apparently on the road to recovery, when he developed a right-sided pneumothorax, to which he quickly succumbed.

The most striking symptom in this case had been from the beginning intense pain in the lower part of the abdomen, but accompanied by such slight local tenderness and muscle spasm as to make us doubtful of the existence of any definite inflammatory lesion in the abdomen, and for this reason

operation had been declined. And yet it was impossible to determine definitely as to the nature of his trouble until the appearance of the swelling in the upper part of the thigh rendered certain the diagnosis.

One could multiply instances of the confusing and misleading effect of referred pain, the pain in the knee from hip disease, in the ear from cancer of the tongue, in the abdomen in Pott's disease, in the absent member after amputation, in the shoulder in gall bladder disease, and in the arms in angina pectoris, but it will suffice to direct attention strongly to the fact that pain is not infrequently referred to localities far removed from the seat of the causative lesion; and in cases where local signs do not correspond with those usually observed in pain arising in that locality a thorough search should be instituted for a possible explanation existing elsewhere. In doing so it is well to bear in mind Hilton's axiom, namely, that "Pain felt in any part must be expressed by the nerves supplying the part."

There is a definite psychology of pain difficult to understand, perhaps, but nevertheless well recognized by every intelligent observer. Some one has said that pain is the resultant of two factors, the lesion and the patient, and in order to arrive at an intelligent appreciation of its true significance both must be thoroughly understood.

The mental state of the sufferer varies greatly in different individuals and at different times. Frequently he will unintentionally deceive the physician by his inability accurately to describe his sensations; especially is this true of pain, which is purely subjective. Again he may do so intentionally by false statements as to its character, location, and intensity. In some, pain brings out the heroic, often to a very unexpected degree. In others it develops the hitherto unsuspected "yellow streak." It does not always follow that because a patient bears what appears to be a great amount of pain with remarkable fortitude, that that individual is more deserving of credit or shows greater self-control than the one who does not; for it is a well-established fact that pain is not felt to the same degree by all individuals alike, some are much more tolerant of it than others. Indeed cases have been reported of individuals naturally analgesic who

do not seem to suffer pain at all. The analgesia of hysteria is also well known and usually easily recognized.

What may cause intense suffering in one will produce little effect upon another. I was struck with this fact not long since while reducing a Pott's fracture in the case of a young man who was in other respects in excellent health. I suggested giving him an anesthetic, but he requested that I proceed with my manipulations without it. I did so, and with considerable difficulty and the exercise of some necessary force succeeded in satisfactorily reducing the fracture. During the whole procedure he had sat up in bed and watched what was being done with great interest and with little evidence of suffering. After it was over he declared that, while it had not been an altogether agreeable sensation, he had suffered no pain of any consequence. On the other hand, it is a not infrequent occurrence to hear a patient declare, and with every evidence of truthfulness, that he or she was suffering extreme agony, when there was no demonstrable physical or pathological basis to lead one to believe that such was the case. What is known as temperament plays a great part in the ability of an individual to bear pain. Just what this is it would be difficult to state in words. The old idea of the knowledge of the constitution of the patient supposed to be possessed by the family doctor has something to commend it.

Being but a subjective symptom it is at times hard to estimate the degree of pain, or indeed whether or not it is present at all, as it is easy to feign. There are certain signs, however, which denote intense suffering and which when present are usually unmistakable, the pinched features, the knotted brow, the rolling eyes with widely dilated pupils, the ashen countenance, the cool and clammy skin, the thready pulse, the increased blood pressure, the hands alternately clenched and opened, grasping wildly at surrounding objects or persons, or perhaps pressed firmly over the painful area, add to this the cries and groans, the bodily contortions and writhing so frequently seen in this connection, and a picture is presented so definite and unmistakable that it cannot fail to be recognized. But it is not always thus, — one sees now and then exhibitions of won-

derful fortitude in the bearing of suffering, when not a groan escapes the sufferer nor any evidence of the existence of pain, save that indefinable expression of countenance so well understood by the initiated. Is there or can there be anything more sublime or more inspiring in its effect upon others than such an exhibition of self-control? Pain may be so intense as to notably depress the heart's action, even to temporary arrest. If of great intensity it may be complete and death may follow.

The fear of pain plays a large part in its psychology. So terror stricken, indeed, may an individual at times become as to seek self-destruction in order to avoid a repetition of some dreadful experience. It also exercises a markedly deterring effect in various ways upon conduct, thus preventing, through fear of painful consequences, many foolish actions.

The wearing effect of pain upon one's powers of inhibition must have attracted the attention of every surgeon. So often does one see the defenses, one after another, broken down by continued and recurring pain,—the individual whose fortitude in the beginning may have been surprising may gradually, owing to this peculiar effect, become in the course of time the whining, complaining creature, shrinking and crying aloud at the slightest touch, a sore trial and an object of pity alike to every one with whom he comes in contact.

Others may become embittered and hardened, their dispositions soured, their whole mental attitude and their outlook upon life in general changed and rendered thoroughly pessimistic by suffering.

There is upon the other hand perhaps no burden which humanity is called upon to bear, unless it may be grief, which itself is looked upon as a form of mental pain, that may have so refining and ennobling an influence, or may bring out more forcibly the higher qualities of head and heart, or develop nobler traits of character. How forcibly is this fact now and then brought home to all of us as we have looked into the face of some patient sufferer, purified and rendered truly beautiful by the discipline of pain, and how much it has increased our admiration and respect for human kind.

Owing to the inability of the sensory apparatus to transmit two strong impressions at the same time, the stronger of the two for the moment will monopolize the attention of the individual. The newspapers nowadays are filled with thrilling accounts of valorous deeds performed upon the battle-fields by brave soldiers who, themselves severely wounded, in the enthusiasm of the moment and unmindful, indeed for the time being unconscious of their own suffering, have rescued some more seriously wounded comrade, and then after this has been accomplished, for the first time conscious of their own pain, have collapsed.

Not long since I was interested and not a little amused to observe in the crowd of yelling, dancing students who swarmed upon the field at the end of a closely contested game of football, a patient of mine, a student in the victorious college, who not long before had severely injured his knee while playing in a practice game, and since which time on account of severe pain had been able to go about only with the aid of crutches. He was careering as madly as the nimblest among them, one crutch had been discarded, the other was waving frantically in the air over his head, — for the moment, at least, in the exuberance of joy in the success of his team he appeared utterly oblivious to pain. The next day when I saw him it is needless to say he was paying the penalty.

Certain sensations which are not ordinarily associated with pain may, when of sufficient intensity or when long enough continued, gradually merge into it, — for instance, those of fullness and emptiness accompanying an over-distended or an empty stomach. To one who has survived the starvation treatment of typhoid fever as practised in this hospital twenty-five years ago, the pangs of hunger are no figment of the imagination, but a real pain that leaves a lasting impression upon the mind of the sufferer. I speak feelingly. So also with heat and cold, and with certain forms of local stimulation, chemical and otherwise, of the tissues of the body, at first perhaps grateful, even pleasurable, later and almost unconsciously, as the intensity increases, becoming painful. So too every one who has experienced a severe pain or has had the opportunity to observe its effects

upon others must have noticed with satisfaction after its subsidence the sensation of well-being, amounting at times and especially in individuals of certain temperaments almost to exhilaration. This is peculiarly so in women after the completion of a hard and painful labor. One can readily appreciate and understand the philosophy of the little darkey when he said he "sho' did like to git kicked on de shins, cause dey felt so good after dey stopped hurtin'."

"Every pain has its distinct and pregnant significance if we will but carefully search for it." This sentence, quoted from that classical work by Hilton, entitled "Lectures on Rest and Pain," expresses better than can I in any other words the idea that I had in mind in choosing the subject for this address. If this be true then it follows of necessity that the surgeon when consulted by a patient for the relief of his pain will not have performed his whole duty toward his patient if he has not made use of every means in his power to discover just what is the peculiar significance of this particular pain. It does not necessarily follow that even by careful searching this significance can always be found out, but this fact does not relieve the surgeon of the obligation to make a *bona fide* effort to discover it. This search in turn may involve some very complex and far-reaching problems. It presupposes upon the part of the surgeon the requisite amount of knowledge and training, coupled with the ability, the willingness, and the facilities necessary to carry out the examination and investigation in order to obtain the necessary data; then more important than all is the judgment with which properly to interpret the findings. For in diagnosis symptoms are of value only when we are able to interpret them in terms of the particular disease under consideration. This is especially true in the case of subjective symptoms, where so much reliance has to be placed upon the word of the patient.

A study of pain by itself is of interest and value to the physician from a diagnostic standpoint. But when taken in connection with other symptoms its proper interpretation is rendered far easier. In attempting, then, to determine the significance of a certain pain it is advisable not to dissociate it from its attendant clinical phenomena; thus a pain in the

epigastric region of a youth, when accompanied by tenderness and rigidity of the right rectus muscle in its lower half, a rise in pulse rate and temperature, and an increase in the leucocyte count, would very strongly suggest an acute appendicitis rather than any other acute abdominal affection. This statement would seem elemental and almost self-evident. But the frequency with which one sees the mistake made of failing to recognize this fact prompts the reference to it. Says Maurice Richardson, "Alone, pain indicates danger in general; in combination with other signs it indicates danger in particular and guides the surgeon's hand to its source." But it alone cannot always be relied upon in estimating the nature and extent of the causative lesion. Many authors have dealt with this particular aspect of our subject. Mackenzie especially has drawn attention to the valuable aid to diagnosis afforded by a careful study of pain and the nervous phenomena which accompany it. In our effort to elicit the more obscure symptoms that arise from disordered functions of diseased viscera it has sometimes happened that insufficient attention has been paid to the commoner and more obvious symptoms. The laboratory methods of clinical diagnosis, the so-called special tests, are of the utmost importance, and any attempt to deprecate them should be deprecated. Yet it cannot be denied that to the general practitioner at least, who is the one who sees the patient first and who largely determines the course of treatment to be thereafter followed, the practical value of these methods is small as compared to the information to be gained by the recognition and proper understanding of the symptoms arising from reflex stimulation of the nervous system. We must not shut our eyes to the fact that it is only in a small proportion of cases which the general practitioner sees that the more intricate methods of examination are of use or are available. In the great majority of cases the reflex symptoms lie ready to hand, if only they are recognized, and it is on these alone that he has often to rely for early diagnosis and treatment. How important it is, then, that the commoner symptoms, such as pain, should be carefully studied, so that their message may be correctly interpreted, for it is upon the recognition of the early stages of disease that so much

depends. This fact needs to be especially emphasized at the present time, when, owing to the ease and comparative safety with which an abdominal exploration can be performed, the tendency in some quarters is setting so strongly toward recourse to this easier and shorter method rather than to a careful and painstaking examination and analysis of the symptoms presented. As a result many operators (I use the word advisedly, all operators are not surgeons) have no clear idea in their minds with regard to the nature and origin of many easily recognized evidences of disease. Especially is this true of the so-called reflex phenomena of visceral disease. Of these pain is, of course, the most constant and most important factor. It is easy to satisfy the patient by calling his pain a neuritis or a neuralgia. But before doing so the conscientious physician will consider most carefully the possibility of the existence of some other cause, perhaps of visceral disease, and will take immediate steps to eliminate it as a possibility or to establish its presence as a certainty. It is of the utmost importance that the true significance of these common symptoms, of which pain is the most constant, should be recognized.

Do not discard the old and well-recognized symptoms and methods for the new exclusively, but a study of the common and easily ascertained facts by newer methods will throw a new light upon them and allow of advances that can be made in no other way. At the same time it should not be forgotten that clinical contributions to our knowledge in this direction constitute research work just as truly when made in the wards, by the bedside of the patient, as when performed upon animals in the laboratory.

Pain as a diagnostic factor is of the utmost importance. It has been estimated that ninety per cent of all diseases either begin with it or are at some time or other in their course accompanied by it. In some cases it forms the all-important factor, in others it is only an incident. The character of the pain may be of great assistance in determining its significance. Certain terms are used by patients so constantly in describing pain arising from certain structures or pathological conditions that they have come to have a definite diagnostic value. For instance, pain arising in inflammatory processes,

particularly of bone, is described as "boring" or "throbbing" or "jumping" in character. Nerve pains are consistently described as burning, shooting, or stabbing, while I have been struck with the frequency with which the terms "stinging" or "sticking" have been used by patients to describe the painful sensations experienced fairly early in cancer of the breast. While these and other descriptive terms cannot be said to be of any absolute value they certainly are suggestive.

The relation that pain may bear to certain events is of great assistance at times in differentiating between various conditions. Can anything be more characteristic than the pain of gastric or duodenal ulcer coming on, as it frequently does, at a definite interval after the ingestion of food? Or, more striking still, the pain of an anal fissure beginning shortly after defecation, increasing for several hours until the acme of intensity is reached, then gradually decreasing until it entirely disappears and leaves the patient in perfect comfort until this experience is repeated after the next stool?

Pain seems to be affected by the time of day. It is notoriously worse at night. How often, for instance, does one meet with a patient suffering from an inflammatory bone lesion who gives the history of inability to sleep at night because of the pain, boring in character, which begins in the latter part of the afternoon and gradually increases in intensity through the night until towards daylight, when it rather suddenly decreases to such an extent that sleep becomes possible.

Weather conditions undoubtedly have their effect upon pain. Especially is this true in the changes from good to bad, which not infrequently increase the pain to such an extent as to enable the patient to predict their occurrence with remarkable accuracy. This has been attributed to changes in atmospheric pressure, which affect the nerve mechanism in much the same way as changes in the blood pressure. This is probably the reason why pain is more noticeable at night, although the quiet and the absence of other things to distract one's attention undoubtedly have their effect. It may be that the senses are more acute and so perceive slighter irritation than by day. The recumbent posture, and in the case of certain organs, *e.g.*, bladder or

stomach, their being more full or more empty than by day may make a difference.

Racial characteristics are of importance. Those of the so-called phlegmatic type bear pain better than others.

Sex is a factor not to be disregarded. One observer as the result of his investigations insists that the well-known ability of women to endure pain is due to the fact that their sensibility to painful stimuli of all sorts is appreciably less than that of men.

An important fact to be borne in mind is that abdominal pain is usually accompanied by spasm of the muscles overlying the painful area, — the viscero-muscular reflex of Mackenzie. Especially is this true of the recti, which have the power of segmental contraction over the area of inflammation, and thus may strongly simulate tumors and swellings of various sorts.

A striking instance of the protective action of pain is seen in the case of the various inflammations of the serous surfaces. Here, as Crile points out, the infections which are associated with pain are those in which the trouble may be made more widespread by muscular activity, hence the tendency toward localization of the inflammatory process which is encouraged by the fixation of the parts due to the muscular rigidity which always accompanies to a greater or less degree inflammations of serous surfaces.

The absence of pain where it may be reasonably expected to be present or its sudden cessation in the course of certain diseases are frequently of the greatest diagnostic significance. Take, for instance, a tumor of the breast that has been discovered accidentally, without previous warning of its presence in the nature of uncomfortable sensations, is much more apt to be of a serious nature than one which has given rise to pain and discomfort. I am conscious always of a sense of relief when a woman who has presented herself with a tumor of the breast tells me that she has suffered great pain in it, as this usually means that it is benign.

On the other hand, the history of the sudden cessation of pain in the course of an acute inflammation in the right side of the abdomen, for instance, may be of the gravest import, particularly if not associated with a corresponding drop in

the temperature, pulse rate, and leucocyte count. Under these circumstances it is an unfailing index of gangrene or rupture of the appendix, or of the sudden breaking down of the protective barriers between an abscess and the general peritoneal cavity, a catastrophe which, unfortunately, is not infrequently misunderstood and unrecognized by the uninitiated.

As pointed out by Mayo in one of the previous Ether Day addresses, medicine owes a great debt to surgery. Recent accumulated observations upon the operating table have laid the foundation of a true pathology of the living, and have enabled us to recognize that there is a definite anatomical cause for many well-recognized groups of symptoms which had hitherto been regarded as functional in origin. Through the medium of surgical operations now performed with great frequency and safety, but which were formerly regarded as quite out of the question, we have been taught the true significance of many of the symptoms which hitherto have been universally misunderstood. Especially is this true with regard to the affections that have to do with the abdominal viscera, for here abdominal operations have added enormously to our knowledge of the significance of pain by demonstrating both its immediate and its contributing causes.

But although the significance of certain painful sensations may be thus understood, their actual cause is in many instances as obscure as ever. The difficulty lies in trying to understand the origin of pathological sensations so long as the degree of sensibility of healthy or diseased organs to various stimuli remains largely unknown.

Pain is probably the most generally present as well as the most trying of all symptoms, and therefore the most important as an aid to diagnosis and as a monitor in directing and fixing the attention of the patient to the fact that there is something wrong. To this extent it is distinctly beneficial. So it is, then, that pain is not always wholly harmful in its effects upon the individual or the race, and, as such, is a not unmixed evil, at times even a real blessing in disguise.

The especial value of pain to the patient lies in the fact that in most pathological conditions, if it is not the first index

of existing trouble, it is nevertheless the first whose warnings are heeded.

Incidentally pain is a good friend to the doctor as well. It, more than any other factor, brings him patients. For while other and sometimes even more significant symptoms may have existed unheeded for a long time, it is only a matter of a bad enough pain when every one is driven to seek relief at the hands of his doctor. Failing in this he now willingly, yes, eagerly, seeks the formerly dreaded surgeon. Indirectly pain may serve the patient a good turn through the medium of his doctor, for it is unquestionably true that the surgeon who has himself been operated upon as a result thereof is apt to display a more intelligent and sympathetic interest in his patient's comfort. In his hands unnecessarily rough manipulation of sensitive structures and too tight bandages are apt to be of infrequent occurrence.

In these latter days when, owing to the predominating influence of certain individuals or schools of medicine, the trend of medical teaching has set so strongly toward therapeutic nihilism, one is apt to forget that the duty of the physician or surgeon does not end with the completion of an exhaustive and scientifically accurate physical examination and diagnosis, but that it is just as much a part of it to treat the ills, physical and mental, real or imaginary, of his patient. Indeed it not infrequently happens that the treatment of the case may require a far greater exercise of knowledge and of judgment than the diagnosis, which in many cases can be made in the laboratory without even seeing the patient. It is not my purpose to belittle in any way the value to the physician of diagnostic ability of the highest order, — far from it, — but I do wish to emphasize the necessity of paying greater attention to the complaints of the patient, especially to his history of pain, failure to relieve which, upon the part of the doctor, is so apt to be followed by a resort to the charlatan and the quack. Recognition of this fact, aided greatly by the untiring efforts of a member of the medical staff of this hospital, Richard Cabot, is slowly gaining headway. The profession — largely due, I am constrained to believe, to a misconception of its duty in this regard, to faulty teaching, and as a reaction against over-

dosage and the blind administration of drugs — has neglected its duty in this respect. I shall never forget an incident that happened early in my professional career and which made a lasting impression upon me. An elderly physician, a type of the old school family physician, was ill with angina pectoris, from which he suffered paroxysms of intense pain. He was attended by the foremost physician of the city, a leader in his profession, a professor of medicine in the local school. Realizing the desperate and hopeless character of his malady, little had been done for the patient save careful nursing and rest in bed. I happened to be present upon the occasion of one of the attending physician's characteristic visits, a cheery greeting, a jolly, a glance at the chart, a momentary examination of the chest, a whispered conversation with the nurse, a skillful interruption of attempted statements or parrying of questions upon the part of the patient, a short adieu, and a rather hurried exit, which in this instance was delayed somewhat by a vehement outburst upon the part of the patient of righteous indignation that no apparent steps had been taken toward the relief of the intense pain from which he was suffering. Turning to me the patient exclaimed: "What's the use of having the best doctor in the city if he does nothing but make a diagnosis and give you a jolly? I am suffering agonizing pain and I want some relief. I had rather have a fifth-rate doctor who relieved my pain than the best doctor in the country who does nothing but make a diagnosis." It is only fair to add that this plea brought the desired relief in the shape of a p.r.n. order for a hypodermic of morphia.

It must not be forgotten that the good effects of pain occur early in the course of the disease. Later, and the longer it is continued, the more injurious it becomes. This fact should materially modify its treatment. In the beginning and until the diagnosis has been made, or at least until the possible causes of the pain have been as far as possible determined, the effect of the pain, by calling attention to the existence of trouble and helping to locate it, is distinctly beneficial. During this period anodynes and analgesics, except in extreme cases, should be withheld. But as soon as the pain has ceased longer to be of service, and by its continuance

can only do harm by reducing the patient's resistance and exhausting his nervous energy, then it is that relief, adequate and complete, is urgently indicated. But just here is required the exercise of that *sine qua non* for the proper carrying out of all surgical procedures, namely, good judgment. It is essential to the successful treatment of any case where pain is a prominent feature to know when to withhold anodynes so as not to mask the clinical picture, and when to administer them. For upon the full recognition of this fact will not infrequently rest success or failure. Just here a word of warning and protest ought to be sounded against the practice which is far too prevalent, namely, the indiscriminate use of drugs of all sorts, either with or without the recommendation of a physician. My attention was directed to this only recently, when I was called to see a girl of thirteen who had been suffering greatly from recurrent attacks of headache, and for which her mother told me she had upon her own authority been giving the child for some time doses of gr. xx of aspirin three times daily, the ill effects of which were very apparent in her condition. Far too great risks are thus incurred of establishing the drug habit in susceptible individuals.

The desired results may usually be obtained by the competent and conscientious surgeon, while at the same time safeguarding the best interests of the patient.

The proper use of drugs directed toward the relief of pain may be productive of great good in materially lessening its ill effects, by robbing disease of its greatest terror, by rendering far less formidable surgical operations, and shortening convalescence through the conservation of physical and nervous energy. There are many agencies at our disposal in addition to drugs to be used for this purpose. Hilton early called attention to the great therapeutic value of physiological rest. The X-rays and radium are useful in relieving the pain of inoperable carcinoma. Crile with his anoxic-association has made a distinct addition to our armamentarium. But among them all, and their name is legion, ether is easily the first, and, all things considered, has for general use no real rival.

Fortunately the beneficent effect of ether is most felt in

that large group of cases in which pain accomplishes no good purpose. The pain of a surgical operation can be of no possible advantage either to the patient or the surgeon. On the contrary, it greatly exhausts the nervous energy of the patient, lowers his resisting powers, and so delays convalescence, while it interferes very materially with the operations of the surgeon, not only physical, but mental. For no human being — and I have found surgeons as a class intensely human as well as humane — can do his best knowing that he is inflicting untold suffering upon his patient; and no patient, under the stimulus of such intense physical pain, can remain sufficiently quiet to permit the surgeon to do his work under satisfactory conditions.

While in its immediate or its after effects it may not be an ideal anesthetic, nevertheless when properly administered, as it should always be by expert hands, either alone or when preceded by or in combination with other drugs, as practised in certain clinics, the good effects of ether are so pronounced and its ill effects so reduced to the minimum, while at the same time the risks are so infinitesimal as to make it altogether the greatest boon ever given to suffering humanity. No wonder, then, that the trustees of the Massachusetts General Hospital should have instituted the custom of meeting annually to commemorate the first public use of ether in the performance of a surgical operation in this hospital sixty-eight years ago. All honor to the great names of Morton and Warren, and to this noble institution, for their respective parts in that epoch-making event.



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Significance and
effect of pain.

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